Field Performance of the Skindex-17 Quality of Life Questionnaire: A Comparison with the Skindex-29 in a Large Sample of Dermatological Outpatients

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The utilization of health-related quality of life (HRQoL) questionnaires in routine clinical practice is hampered by several factors, including their length and thus the time needed to complete and score them. For this reason, growing efforts are devoted both to create short questionnaires and to shorten existing ones. The Skindex-17 is a dermatological HRQoL instrument that was derived from the Skindex-29 using Rasch analysis. It consists of 17 items instead of 29, and answers are given on a three-point scale instead of a five-point scale. The aim of this study was to compare information obtained by the Skindex-29 and the Skindex-17 in a large sample of dermatological outpatients. We compared the Skindex-29 with the Skindex-17 scores in 2,487 patients with several dermatological conditions, using intraclass correlation coefficients. The overall correlation was 0.957 for the symptoms scale and 0.940 for the psychosocial scale. The values were very similar for all diseases. The concordance between the levels of severity of the Skindex subscales in the two instruments was also very high. In conclusion, the Skindex-17 provided very similar information compared with the Skindex-29, with the advantage of being shorter and including some important psychometric properties.

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INTRODUCTION

The measurement of health-related quality of life (HRQoL) in dermatological patients is now recognized as an important step in the knowledge of the burden that skin disease may pose on patients. HRQoL has become an essential outcome parameter in randomized controlled clinical trials, clinical research, clinical practice, and health-care management.

Many HRQoL instruments are available in dermatology; however, their psychometric characteristics have not always been properly evaluated (Both *et al.*, 2007), and often there are no indications for the interpretation of the results. The Skindex-29 (Chren *et al.*, 1997a, 1997b) is recognized as one of the best HRQoL dermatological instruments (de Korte *et al.*, 2002). Its properties have been thoroughly evaluated, and different studies have been conducted for the interpretation of its scores (Nijsten *et al.*, 2009; Prinsen *et al.*, 2010, 2011). A recent review of HRQoL measurement in dermatology recommended the combination of the Skindex-29 and the 36-Item Short Form Health Survey (SF-36) as the instruments of choice in dermatology (Both *et al.*, 2007).

However, although in clinical research the administration of questionnaires is a feasible task, the utilization of HRQoL in clinical practice is hampered by several factors, such as the time necessary to complete the questionnaire, its length, and the need for accurate data entry and data management to obtain a final score. For this reason, the shorter a questionnaire is, the easier it will be for the dermatologist to administer it during routine daily practice.

A shorter questionnaire was derived from the Skindex-29 using Rasch analysis: the Skindex-17 (Nijsten *et al.*, 2006). It is composed of 17 items, and answers are given on a three-point scale instead of a five-point scale. The aim of this study was to compare information obtained by the Skindex-29 and the Skindex-17 in a large sample of dermatological outpatients, to evaluate similarities and discrepancies between the scores obtained from the two versions of the Skindex, and to determine whether the use of the shorter form of the questionnaire might cause a loss of information.

RESULTS

Questionnaires were given to 3,999 patients, and 2,732 agreed to participate (response rate 68%).

Sixty-one physicians participated in the study. Data were complete for 2,487 patients. Of them, 58.6% were women. The mean (SD) age for men and women was 46.5 (18.3) and 45.0 (17.8), respectively.

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Abbreviations: DIF, differential item functioning; HRQoL, health-related quality of life

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Table 1. Mean values of the Sk-29 and of the Sk-17 scores and their ICC in different dermatological conditions

		Symptoms			Psychosocial		
	n	Sk-29	Sk-17	ICC	Sk-29	Sk-17	ICC
Acne	193	33.2	37.3	0.939	32.1	33.6	0.927
Alopecia androgenetic	77	13.0	15.5	0.950	16.3	16.4	0.901
Alopecia areata	52	9.9	9.8	0.948	22.0	23.4	0.929
Bacterial infections	53	40.2	44.6	0.910	26.0	26.0	0.907
Balanitis	25	33.6	37.2	0.889	24.0	27.2	0.951
Benign skin neoplasias	175	13.9	15.7	0.930	10.0	8.2	0.907
Dermatitis	249	45.1	50.2	0.942	25.9	26.6	0.937
Hair loss	27	17.8	21.1	0.968	22.3	21.2	0.941
Lichen planus	32	34.2	38.4	0.942	20.3	16.8	0.914
Mycoses	116	28.1	31.8	0.954	17.4	17.0	0.925
Nail conditions	38	17.4	20.0	0.964	17.0	15.0	0.862
Nevi	306	10.3	12.3	0.925	8.7	6.7	0.911
Non-melanoma skin cancers	79	18.2	19.6	0.930	12.8	9.2	0.890
Pemphigus/bullous diseases	17	44.2	46.0	0.968	38.3	37.0	0.983
Pityriasis rosea	29	27.6	31.1	0.882	21.0	19.6	0.920
Pruritus	54	49.2	53.7	0.903	29.4	24.8	0.953
Psoriasis	220	47.9	54.2	0.946	32.5	33.0	0.941
Rosacea	60	33.3	33.2	0.951	26.2	26.1	0.953
Scabies and other ectoparasitic infections	34	51.5	57.0	0.942	40.7	40.8	0.935
Scars	19	29.1	33.2	0.971	33.2	33.3	0.942
Scleroderma/ connective tissue disorders	49	35.2	40.0	0.954	28.5	29.2	0.953
Seborrheic dermatitis	85	33.5	36.3	0.942	19.1	20.2	0.906
Urticaria	29	44.8	44.8	0.908	27.5	28.4	0.921
Viral infections	68	19.9	21.1	0.946	18.0	16.9	0.939
Vitiligo and other pigmentation disorders	54	12.0	11.3	0.916	19.5	20.3	0.921
Other dermatoses	60	39.1	41.3	0.948	29.0	30.3	0.920
Missing and other diagnoses	287	28.2	29.6	0.956	21.2	20.9	0.929
Overall	2,487	28.9	31.9	0.957	21.6	21.1	0.940

Abbreviations: ICC, intraclass correlation coefficient; Sk-17, Skindex-17; Sk-29, Skindex-29.

Table 2. Mean values of the Sk-29 and of the Sk-17 scale scores, and their ICC in different levels of variables of interest

			Symptoms			Psychosocial		
Variable	Level	*N*[1]	Sk-29	Sk-17	ICC	Sk-29	Sk-17	ICC
Overall		2,487	28.9	31.9	0.957	21.7	21.1	0.940
Gender	Male	1,022	27.2	31.0	0.952	19.5	19.4	0.941
	Female	1,449	30.1**	32.5	0.960	23.2**	22.4**	0.939
Age (years)	18–29	630	27.6	30.8	0.957	23.5	23.5	0.942
	30–39	510	28.2	31.4	0.963	21.9	22.4	0.932
	40–49	412	29.9	33.5	0.960	22.1	21.3	0.937
	50–64	467	31.0	34.0	0.954	21.3	20.8	0.943
	65+	446	28.5	30.4	0.948	18.4**	15.5**	0.948
Education	None	33	34.3	35.2	0.941	26.1	22.8	0.892
	Primary	217	35.4	37.4	0.945	23.9	19.9	0.959
	Middle	485	31.5	33.9	0.956	22.7	21.9	0.948
	High	1,063	27.9	31.3	0.960	21.1	20.6	0.940
	University	602	26.1**	29.3**	0.955	20.6	21.4	0.930
Marital status	Single	1,045	27.8	30.9	0.960	22.2	22.5	0.937
	Married/ partner	1,092	29.8	32.6	0.954	20.8	19.4	0.940
	Separated/ divorced	145	29.8	33.3	0.964	24.3	23.9	0.950
	Widow/er	126	32.6	35.0	0.947	22.8	20.7*	0.952
PhGA	Very mild	242	16.4	17.7	0.956	13.4	11.5	0.912
	Mild	937	25.4	27.9	0.950	18.2	17.3	0.932
	Moderate	889	33.1	36.6	0.956	25.0	24.9	0.945
	Severe	177	42.0	47.4	0.960	33.5	35.7	0.933
	Very severe	32	50.0**	54.2**	0.966	42.1**	43.2**	0.926
PtGA	Very mild	442	14.4	16.5	0.942	9.5	8.4	0.919
	Mild	761	24.2	27.0	0.944	17.1	16.2	0.921
	Moderate	702	36.4	39.8	0.944	26.5	27.1	0.918
	Severe	218	48.0	52.5	0.958	40.8	42.8	0.920
	Very severe	77	58.3**	61.4**	0.962	48.1**	49.1**	0.944

Abbreviations: ANOVA, analysis of variance; ICC, intraclass correlation coefficient; Sk-17, Skindex-17; Sk-29, Skindex-29; PhGA, physician global assessment; PtGA, patient global assessment.
*$P<0.05$, **$P<0.01$ from the *t*-test and the ANOVA for the comparison among the different levels of each variable.
[1]Totals vary because of missing figures.

Table 1 shows the mean values of the Skindex-29 and the Skindex-17 scores, and their correlation in different dermatological conditions. The overall intraclass correlation coefficient was 0.957 for the symptoms scale and 0.940 for the psychosocial scale. The values were very similar for all diseases.

The mean values of the Skindex-29 and of the Skindex-17 in different levels of different variables are reported in Table 2. With the only exception of gender in the symptoms scale (Skindex-29 mean value was higher in women than in men, whereas there was no difference for the Skindex-17) and marital status in the psychosocial scale, there was concordance between Skindex-29 and Skindex-17 in the differences for all the variables.

Higher scores of the symptoms scale of both Skindex were associated with lower education and with higher disease severity, both from the point of view of the physician and of the patient. The psychosocial scores were higher in women, in younger patients, and in patients with higher disease severity, for both instruments.

Table 3. Comparison between the categorization of the Skindex-29 and the Skindex-17 for the different subscales

	Skindex-29 symptoms				
Skindex-17 symptoms	Very mild (0–3.9)	Mild (4–10.9)	Moderate (11–25.9)	Severe (26–49.9)	Very severe (50+)
Not severe (0–49.9)	566 (100%)	241 (100%)	444 (99.1%)	391 (66.6%)	20 (3.5%)
Severe (50+)	0 (0.0%)	0 (0.0%)	4 (0.9%)	196 (33.4%)	554 (96.5%)
	Skindex-29 emotions				
Skindex-17 psychosocial					
	Very mild (0–5.9)	Mild (6–24.9)	Moderate (25–49.9)	Severe (50+)	
Mild (0–20.82)	398 (99.7%)	749 (89.4%)	238 (32.7%)	5 (1.4%)	
Moderate (20.83–37.5)	1 (0.3%)	88 (10.5%)	316 (43.5%)	54 (14.6%)	
Severe (37.51+)	0 (0.0%)	1 (0.1%)	173 (23.8%)	310 (84.0%)	
	Skindex-29 functioning				
Skindex-17 psychosocial					
	Very mild (0–3.9)	Mild (4–10.9)	Moderate (11–32.9)	Severe (33+)	
Mild (0–20.82)	844 (100.0%)	431 (83.2%)	115 (20.0%)	0 (0.0%)	
Moderate (20.83–37.5)	0 (0.0%)	84 (16.2%)	347 (60.2%)	28 (7.1%)	
Severe (37.51+)	0 (0.0%)	3 (0.6%)	114 (19.8%)	367 (92.9%)	

The psychosocial scale of the Skindex-17 was compared with both the emotions and the functioning scale of the Skindex-29, as it was derived from both of them. *P*-values from χ^2-test were always lower than 0.001.
The cutoffs of the Skindex-17 scores (here on a 0–100 scale) correspond to 5 for the symptoms, and 5 and 9 for the psychosocial scale, as originally published (Nijsten *et al.*, 2006). The cutoffs of the Skindex-29 are those originally published in Nijsten *et al.* (2009).
The range of the categories of both instruments are reported in parenthesis.

The comparison between the categorization of the Skindex-29 and the Skindex-17 for the different subscales is reported in Table 3. The concordance was very high, with a *P*-value lower than 0.001 for each of the comparisons. In the symptoms scale, 99.1% of patients who were included in the classes ''very mild'' to ''moderate'' in the Skindex-29 were grouped in the ''not severe'' category of the Skindex-17, and 96.5% of patients considered as ''very severe'' in the Skindex-29 categorization were categorized in the ''severe'' class of the Skindex-17. However, there were also 411 patients with a severe or very severe impairment in HRQoL according to the Skindex-29, who were classified as having a ''not severe'' impairment by the Skindex-17.

The comparison of the psychosocial scale of the Skindex-17 with the emotions subscale of the Skindex-29 showed a high concordance for the ''severe'' class of both instruments (84.0% of patients), and for the ''very mild'' class of the Skindex-29 and the ''mild'' category of the Skindex-17 (99.7%). The concordance of the psychosocial scale of the Skindex-17 was higher with the functioning scale of the Skindex-29 than with the emotions scale. In fact, 92.9% of patients were classified as ''severe'' by both instruments and 100.0% of ''very mild'' and 83.2% of ''mild'' were in the ''mild'' class of the Skindex-17.

Table 4 summarizes the results of the differential item functioning (DIF) analysis. Although several items of the Skindex-17 showed a significant DIF, it is notable that in all cases, the corresponding Skindex-29 items also had a significant DIF. In addition, item 29 of the Skindex-29 (i.e., sex life) had a significant DIF, whereas the corresponding item in the Skindex-17 did not.

DISCUSSION

In the present study, we observed a very high concordance between the Skindex-29 and the Skindex-17 scores in a large group of patients with different dermatological conditions.

The Skindex-29 is a well-designed, validated, and extensively used dermatological HRQoL questionnaire, and it is already a refinement of a 61-item version (Chren *et al.*, 1996) obtained using classical test theory to retain or discard items. The concepts and the assumptions of classical test theory have been the foundation for measurement theory for over 80 years. Afterward, methods based on item response theory, such as the Rasch model (Rasch, 1960–1980; Streiner and Norman, 1989; Tennant *et al.*, 2004), have been suggested to be used in psychometrics. Compared with classical test theory, these approaches have the ability to solve some problems such as response order (i.e., logical ordering of the response categories), additivity, which requires unidimensionality of the measurement, and DIF (i.e., assessing the effect of external factors on item response) (McHorney, 1997; Tesio, 2003; Tennant *et al.*, 2004). The Skindex-17 is a

Table 4. *P*-values from the differential item functioning analysis in different skin conditions for Skindex-17 and Skindex-29

Skindex-29 items	Skindex-17 items	Skindex-29	Skindex-17
1. My skin hurts	1	**<0.001**	**<0.001**
2. My skin condition affects how well I sleep		**0.017**	
3. I worry that my skin condition may be serious		**<0.001**	
4. My skin condition makes it hard to work or do hobbies	2	0.197	0.079
5. My skin condition affects my social life	3	0.056	0.170
6. My skin condition makes me feel depressed	4	**0.008**	**0.014**
7. My skin condition burns or stings		**<0.001**	
8. I tend to stay at home because of my skin condition	5	0.196	0.058
9. I worry about getting scars from my skin condition		**<0.001**	
10. My skin itches	6	**<0.001**	**<0.001**
11. My skin condition affects how close I can be with those I love	7	0.659	0.616
12. I am ashamed of my skin condition		**<0.001**	
13. I worry that my skin condition may get worse		**<0.001**	
14. I tend to do things by myself because of my skin condition	8	0.724	0.254
15. I am angry about my skin condition		**0.011**	
16. Water bothers my skin condition (bathing, washing hands)	9	0.158	0.140
17. My skin condition makes showing affection difficult	10	0.478	0.719
19. My skin is irritated	11	**<0.001**	**<0.001**
20. My skin condition affects my interactions with others		0.206	
21. I am embarrassed by my skin condition	12	**<0.001**	**<0.001**
22. My skin condition is a problem for the people I love		**0.023**	
23. I am frustrated by my skin condition	13	**<0.001**	**0.005**
24. My skin is sensitive		0.235	
25. My skin condition affects my desire to be with people	14	0.073	0.363
26. I am humiliated by my skin condition	15	0.216	0.558
27. My skin condition bleeds	16	**<0.001**	**<0.001**
28. I am annoyed by my skin condition		**<0.001**	
29. My skin condition interferes with my sex life	17	**0.010**	0.123
30. My skin condition makes me tired		0.096	

Bold *P*-values indicate significant differential item functioning.

Rasch-reduced version of the Skindex-29, and thus, it was derived with the aim of having all those properties.

Moreover, the Skindex-17 has the practical advantage of being shorter than the Skindex-29. Not only does it have fewer items but also the possible answers are on a three-point scale instead of a five-point scale, making it quicker to fill for the patient. As underlined by the authors (Nijsten *et al.*, 2006), collapsing or reducing response categories does not necessarily decrease the precision of an HRQoL instrument (Piccinelli *et al.*, 1993; de Jong *et al.*, 1997).

The choice of an HRQoL instrument to be used in clinical practice is mainly based on its psychometric properties, but its length is not a trivial aspect. In the busy daily-routine clinical practice, the dermatologist often has very limited time to wait for the patient to fill in the questionnaire, and patients prefer short and clear questionnaires (Mehanna and Morton, 2006).

The very high correlation between the Skindex-29 and Skindex-17 observed in this study suggested that the Skindex-17 might be used instead of the older and longer version without losing any significant information. This was true for all the observed diagnostic categories and for the different subscales of the instrument.

In addition, DIF analysis for the different diagnoses confirmed that the Skindex-17 items behaved at least as well as the corresponding ones in the Skindex-29, and among the common items, there was actually one less item with a significant DIF.

However, the Skindex-17 is still a young instrument, whose psychometric properties and clinical value need to be tested in other populations. On the other hand, the Skindex-29 is an instrument used worldwide, with several international versions, and for which the psychometric properties have been verified countless times. Moreover, in the Skindex-17, the emotions and functioning scales are combined, which simplifies the instruments, but results in a loss of information, as, of the two scores yielded by the Skindex-29, only one is available for the Skindex-17. In addition, the psychosocial scale is mostly composed of functioning items, and in fact it correlates more with the functioning scale of the Skindex-29 than with the emotions scale of the original instrument. Furthermore, specific pieces of information available in a single-item analysis (Sampogna *et al.*, 2004, 2008) may be lost. For example, if one is interested in knowing how often a given condition ''burns or stings,'' this information would be available from the Skindex-29, but not from the Skindex-17.

On the basis of our results, the administration of the Skindex-17 instead of the Skindex-29 seems to provide very similar information while requiring less time and effort for completion, and data entry, and thus for the production of the scale scores. This is particularly desirable when limited time and resources are available, which is usually the case in clinical practice.

However, further studies are needed to investigate whether the Skindex-17 can effectively replace the Skindex-29 while providing comparable information. In particular, more information on patients from different socio-cultural areas and environments would be desirable. In addition, both the validation study of the Skindex-17 and this study have been performed on outpatients, so that other studies

including inpatients or patients seen at day hospital clinics may be useful.

MATERIALS AND METHODS

Dermatological patients were recruited consecutively during the normal outpatient clinic activities of the IDI-IRCCS, a large reference hospital in Rome, Italy, during a survey about HRQoL conducted in the month of March 2010.

HRQoL and psychological questionnaires were provided to all patients asking for a dermatological visit. Questionnaires were completed during the waiting time, and they were returned during the visit to the dermatologist, who reported on the same questionnaire the diagnosis and his/her evaluation of the clinical severity. The questionnaires also included data on patients, such as sex, age, and educational level. Inclusion criteria were as follows: age >18 years, ability to understand and read Italian, and signed written informed consent. The study was approved by the Institutional ethical committee and it was conducted according to the Declaration of Helsinki Principles.

HRQoL data were collected using the Italian version of the Skindex-29 (Abeni *et al.*, 2001, 2002). The Skindex-29 is a dermatological instrument that consists of 29 items, with possible answers on a five-point scale, from ''never'' to ''all the time.'' It constitutes three subscales, measuring symptoms, emotions, and functioning.

The Skindex-17 questionnaire (Nijsten *et al.*, 2006) constitutes two subscales, symptoms and psychosocial, and answers are given on a three-point scale (''never,'' ''rarely/sometimes,'' and ''often/always'').

In this study, as it is really impractical to administer in the same session two questionnaires with the same questions, we used the methodology of other comparative studies of related instruments (Wee *et al.*, 2008) and we derived the Skindex-17 scores for each question from the answers to the corresponding items of the Skindex-29. For this aim, we selected the 17 items of the Skindex-17 out of the 29 of the Skindex-29, and transformed the five-point answers of the Skindex-29 into the three-point answers of the Skindex-17. As the Skindex-17 has two subscales and the Skindex-29 has three subscales, for the purposes of this analysis, the emotions and functioning scales of Skindex-29 were combined into a ''psychosocial'' scale resulting from the mean value of the two subscales. All scale scores, for both the Skindex-29 and the Skindex-17, were transformed to a linear scale of 100, to allow direct comparability of scores between the two instruments.

We compared the Skindex-29 with the Skindex-17 on the summary measures using intraclass correlation coefficients that were obtained by the R free statistical software, Nonlinear Mixed Effects Models package (www.r-project.org). The intraclass correlation coefficient is equivalent to the Kappa statistic for continuous values. It has the advantage over the Pearson's or Spearman's correlation coefficient in that it is a true measure of agreement, combining information on both the correlation and the systematic differences between the readings (Deyo *et al.*, 1991).

The mean values of the Skindex-29 and of the Skindex-17 were compared according to gender, age, education, marital status, physician global assessment, and patient global assessment, using the *t*-test or the ANOVA. In addition, the levels of severity of the Skindex subscales in the two instruments were compared, according to the cutoffs described in previous reports (Nijsten *et al.*, 2006, 2009), using the χ^2-test. For the Skindex-17 categories, the ranges were calculated reporting to a scale 0–100, the cutoffs originally reported by Nijsten *et al.* (2006). For example, the cutoff 5 in the psychosocial scale of the Skindex-17, which has 12 items, becomes 20.82, because the maximum score for 12 items is 24 (the possible answers being 0, 1, 2), and is derived using the simple formula $5{:}24 = \times{:}100$.

To verify that responses to individual items were affected by diagnosis in a comparable way in the two instruments, we performed a DIF analysis (Angoff, 1993) on random subsamples ($n=230$) of our study population according to the procedures described in Nijsten *et al.* (2006). DIF analysis verifies whether a given construct has a similar meaning across different subgroups of patients. In this study, DIF according to skin condition was considered the most likely to impact differentially on the meaning of the construct of quality of life. If there is no significant DIF, then the measures for persons in different groups can legitimately be compared, as they may be accepted as measuring the same variable. The subsamples for the DIF analysis were a proportional stratified random selection of patients with acne, psoriasis, seborrheic dermatitis, alopecia areata, vitiligo, and mycoses. The interactive computer software program RUMM2030 (Andrich *et al.*, 2008) was used to perform the DIF analysis.

CONFLICT OF INTEREST

The authors state no conflict of interest.

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